

CLAIMS

1. An image display device characterized in that a liquid powder composed of a solid material stably floating as a dispersant in a gas and exhibiting a high fluidity in an aerosol state is sealed between opposed substrates, at least one substrate being transparent, and the liquid powder is moved.

2. The image display device according to claim 1, wherein the liquid powder does not have a repose angle as an index indicating its fluidity.

3. The image display device according to claim 1 or 2, wherein an apparent volume in a maximum floating state is two times or more than that in none floating state.

4. The image display device according to one of claims 1 - 3, wherein a time change of the apparent volume of the liquid powder satisfies the floating formula:

$$V_{10}/V_5 > 0.8;$$

here, V_5 indicates the apparent volume (cm^3) of the liquid powder after 5 minutes from the maximum floating state; and V_{10} indicates the apparent volume (cm^3) of the liquid powder after 10 minutes from the maximum floating state.

5. The image display device according to one of claims 1 - 4, wherein an average particle size $d(0.5)$ of a particle material constituting the liquid powder is $0.1 - 20 \mu\text{m}$.

6. The image display device according to one of claims 1 - 5, wherein a particle size distribution Span of the particle material constituting the liquid powder, which is defined by the following formula, is not more than 5:

$$\text{Span} = (d(0.9) - d(0.1))/d(0.5) ;$$

(here, $d(0.5)$ means a value of the particle size expressed by μm wherein an amount of the particle material constituting the liquid powder having the particle size larger than this value is 50% and an amount of the particle material constituting the liquid powder having the particle size expressed by μm wherein an amount of the particle material constituting the liquid powder having a particle size smaller than this value is 10%, and $d(0.9)$ means a value of the particle size expressed by μm wherein an amount of the particle material constituting the liquid powder having the particle size smaller than this value is 90%).

7. The image display device according to one of claims 1 - 6, wherein a

solvent insoluble rate of the liquid powder, which is defined by the following formula, is not less than 50%:

$$\text{solvent insoluble rate (\%)} = (B/A) \times 100;$$

(here, A is a weight of the liquid powder before being immersed into the solvent and B is a weight of resin components after the liquid powder is immersed into good solvent at 25°C for 24 hours).

8. The image display device according to one of claims 1 - 7, wherein the liquid powder is a material, a surface of which is bonded by inorganic fine particles having an average particle size of 20 - 100 nm.

9. The image display device according to claim 8, wherein the liquid powder is a material, a surface of which is bonded by two or more kinds of inorganic fine particles.

10. The image display device according to claim 8 or 9, wherein the inorganic fine particles are treated by silicon oil.

11. The image display device according to one of claims 1 - 10, wherein the liquid powder is sealed between the substrates by means of an electrostatic coating apparatus.

12. The image display device according to one of claims 1 - 11, wherein a space between the opposed substrates is filled with a gas having a relative humidity at 25°C of not more than 60% RH.

13. The image display device according to one of claims 1 - 12, wherein the image display device is formed by a plurality of display cells.

14. The image display device according to one of claims 1 - 13, wherein a partition wall is formed by one of a screen-printing method, a sandblast method, a photo-conductor paste method and an additive method.

15. The image display device according to one of claims 1 - 14, wherein the partition wall has a cantilever structure.

16. A method of displaying the image characterized in that a liquid powder composed of a solid material stably floating as a dispersant in a gas and exhibiting a high fluidity in an aerosol state is sealed between opposed substrates, at least one substrate being transparent, and the liquid powder is moved.

17. An image display device characterized in that a porous spacer is arranged between opposed substrates, at least one substrate being transparent, a

liquid powder composed of a solid material stably floating as a dispersant in gas and exhibiting a high fluidity in an aerosol state is sealed, and the liquid powder is moved.

18. The image display device according to claim 17, wherein the liquid powder does not have a repose angle as an index indicating its fluidity.

19. The image display device according to claim 17 or 18, wherein hot melt adhesive is applied on an outer portion of the porous spacer.

20. The image display device according to one of claims 17 - 19, wherein an open rate of the porous spacer at a display side having a transparent substrate is 50 - 95%.

21. The image display device according to one of claims 17 - 20, wherein pore sizes of the porous spacer are different at a display side and at a none display side, and $(\text{pore size at a display side})/(\text{pore size at none display side}) > 1.1$ is satisfied.

22. The image display device according to one of claims 17 - 21, wherein an apparent volume in a maximum floating state is two times or more than that in none floating state.

23. The image display device according to one of claims 17 - 22, wherein a time change of the apparent volume of the liquid powder satisfies the floating formula:

$$V_{10}/V_5 > 0.8;$$

here, V_5 indicates the apparent volume (cm^3) of the liquid powder after 5 minutes from the maximum floating state; and V_{10} indicates the apparent volume (cm^3) of the liquid powder after 10 minutes from the maximum floating state.

24. The image display device according to one of claims 17 - 23, wherein an average particle size $d(0.5)$ of a particle material constituting the liquid powder is 0.1 - 20 μm .

25. The image display device according to one of claims 17 - 24, wherein a particle size distribution Span of the particle material constituting the liquid powder, which is defined by the following formula, is not more than 5:

$$\text{Span} = (d(0.9) - d(0.1))/d(0.5) ;$$

(here, $d(0.5)$ means a value of the particle size expressed by μm wherein an amount of the particle material constituting the liquid powder having the particle

size larger than this value is 50% and an amount of the particle material constituting the liquid powder having the particle size expressed by μm wherein an amount of the particle material constituting the liquid powder having a particle size smaller than this value is 10%, and $d(0.9)$ means a value of the particle size expressed by μm wherein an amount of the particle material constituting the liquid powder having the particle size smaller than this value is 90%).

26. The image display device according to one of claims 17 - 25, wherein a solvent insoluble rate of the liquid powder, which is defined by the following formula, is not less than 50%:

$$\text{solvent insoluble rate (\%)} = (B/A) \times 100;$$

(here, A is a weight of the liquid powder before being immersed into the solvent and B is a weight of resin components after the liquid powder is immersed into good solvent at 25 °C for 24 hours).

27. The image display device according to one of claims 17 - 26, wherein the liquid powder is a material, a surface of which is bonded by inorganic fine particles having an average particle size of 20 - 100 nm.

28. The image display device according to claim 27, wherein the liquid powder is a material, a surface of which is bonded by two or more kinds of inorganic fine particles.

29. The image display device according to claim 27 or 28, wherein the inorganic fine particles are treated by silicon oil.

30. The image display device according to one of claims 17 - 29, wherein the liquid powder is sealed between the substrates by means of an electrostatic coating apparatus.

31. The image display device according to one of claims 17 - 30, wherein a space between the opposed substrates is filled with a gas having a relative humidity at 25°C of not more than 60%.